

A STUDY OF THE DECAY OF PHOSMET (IMIDAN)
ON THE FOLIAGE OF PEACH TREES
IN STANISLAUS COUNTY, CALIFORNIA
JUNE - JULY 1977

By

Keith T. Maddy, Staff Toxicologist
Susan Edmiston, Agricultural Inspector
Charles Kahn, Agricultural Inspector
Terry Jackson, Agricultural Chemist
Lilia Rivera, Agricultural Chemist

HS-417

California Department of Food and Agriculture
Division of Pest Management, Environmental
Protection and Worker Safety
Worker Health and Safety Branch
1220 N Street, Sacramento, California 95814

A STUDY OF THE DECAY OF PHOSMET (IMIDAN) ON THE
FOLIAGE OF PEACH TREES IN STANISLAUS COUNTY, CALIFORNIA
JUNE - JULY 1977

By

Keith T. Maddy, Staff Toxicologist
Susan Edmiston, Agricultural Inspector
Charles Kahn, Agricultural Inspector
Terry Jackson, Agricultural Chemist
Lilia Rivera, Agricultural Chemist

Agricultural Chemicals and Feed
Department of Food and Agriculture
1220 N Street, Sacramento, California 95814

INTRODUCTION

Phosmet is an organophosphate insecticide in toxicity category two. This pesticide has an oral LD₅₀ (rats) of 93 mg/kg and a dermal LD₅₀ of 1550 mg/kg. Many domestic animals, such as cattle, sheep and goats, are much more sensitive to this material having oral LD₅₀'s in the range of 25 - 50 mg/kg.

Phosmet is used to control codling moth, green apple aphid, redbanded leafroller and many other insect pests of tree fruit and nuts. In 1976, nearly 10,000 pounds of phosmet were reported as applied to 4000 acres of peach trees. Since this is not a restricted material, it may be applied by growers without reporting its use. Thus this reported poundage probably considerably understates its actual usage.

Imidan is a pesticide containing 50 percent phosmet by weight and is formulated only as a wettable powder. (A representative label is included in this report.) The label recommends a preharvest interval of 14 days after application. There is a worker safety interval of one day for Imidan on peaches.

APPLICATION

In this study, a peach orchard was sprayed under the following conditions:

Application rates - Imidan 7-1/2 lbs/acre
Sulfur 20 lbs/acre
Dilution rate - 50 gallons of water/acre
Application equipment - concentrate ground rig (speed sprayer)
Weather conditions - sunny and hot

SAMPLING

Duplicate samples were collected at each sampling interval. Each sample consisted of 100 leaf punches 2.5 cm in diameter. Samples were taken from one row of trees; a punch was taken at the four corners of each tree sampled. One sample was analyzed for total residue while the other was for surface residue analysis.

ANALYTICAL METHODS (Extraction)

The procedure used for the extraction of dislodgeable, penetrated, and total residues from leaf punches was originally published by Gunther in "The Bulletin of Environmental Contamination and Toxicology", 9 243-249, 1973. It has been documented several times in detail, with modifications that were made to accommodate the various pesticides and their metabolites, that the Worker Health and Safety Unit has been concerned with.

The sample container and leaf punches are weighed and the gross weight recorded.

Total Residues

1. The leaf punches are transferred to a blending jar. The empty sample container is again weighed and the net weight of the punches recorded.
2. Approximately 50 gms of sodium sulfate and 100 mls of CHCl₃ are added.
3. The sample is blended at high speed for 3 minutes, keeping the blender cup cool by immersing it in a container of cool water. The blender cup is removed and the sample allowed to settle.
4. An aliquot is decanted into a teflon-capped bottle and stored in the freezer prior to clean up and analysis.

Dislodgeable Residues

1. Fifty mls of water and approximately 4 drops of Sur-Ten solution (1:50) are added to the sample containers. The containers are capped and placed in a multi-purpose rotator and rotated at 30 cycles/min. for 60 minutes. The aqueous solution is decanted through a glass wool plug into a 500 ml separatory funnel.
2. The punches are rotated a second time, using 50 mls of water and 4 drops of Sur-Ten solution, for 30 minutes. This is added to the first extraction.
3. The sample is then hand-shaken for approximately 10 seconds with 30 mls of water. The container is drained into the separatory funnel with the first two extractions.
4. The aqueous solution is extracted three times with 50 ml of ethyl acetate. Roll the separatory funnel 1-1/2 - 2 minutes. Shaking action will cause emulsions. The solvent is filtered through sodium sulfate into a glass-stoppered mixing cylinder and the volume is recorded. The solvent is mixed in the cylinder. An aliquot is decanted into a teflon-capped bottle and stored in the freezer prior to clean up and analysis.

ANALYTICAL METHODS (Chromatography)

Varian 2100 FPD detector, standard flows, 26" x 2 mm I.D. of 3% OV-17 (carbowax vapor-deposition treated) at 220° C, 26° flow.

RESULTS

This study was conducted for 30 days, then the orchard was treated again with Guthion and Imidan. Weather conditions are recorded on Table 1. The average maximum and minimum temperatures were 91.0 and 59.8° F, respectively.

The results of the study are recorded on Table 2 and on Figure 1. Imidan did not decay as rapidly as expected. The residue levels that were determined to be present did not follow a steady rate of decay as expected. Apparently there were some problems in sampling or analysis. A repeat of the study would be expected to produce more consistent results.

TABLE 1

DAILY TEMPERATURE AND RAINFALL FOR JUNE
IN STANISLAUS COUNTY (MODESTO)

<u>Date</u> <u>(1977)</u>	<u>Temperature (°F)</u>		<u>Precipitation</u> <u>(Inches)</u>
	<u>Maximum</u>	<u>Minimum</u>	
6/5	100	65	
6/6	102	68	
7	98	72	
8	92	63	
9	75	59	
10	75	55	
11	84	52	
12	82	53	
13	76	53	
14	83	52	
15	88	52	
16	91	55	
17	81	55	
18	80	54	
19	87	55	
20	89	56	
21	99	63	
22	105	67	
23	98	63	
24	104	64	
25	102	66	
26	96	65	
27	96	62	
28	98	66	
29	97	66	
30	98	62	
7/1	96	66	
2	89	62	
3	87	58	
4	83	54	
5	89	51	
<u>Average</u>		91.0	59.8
		Total	0.00

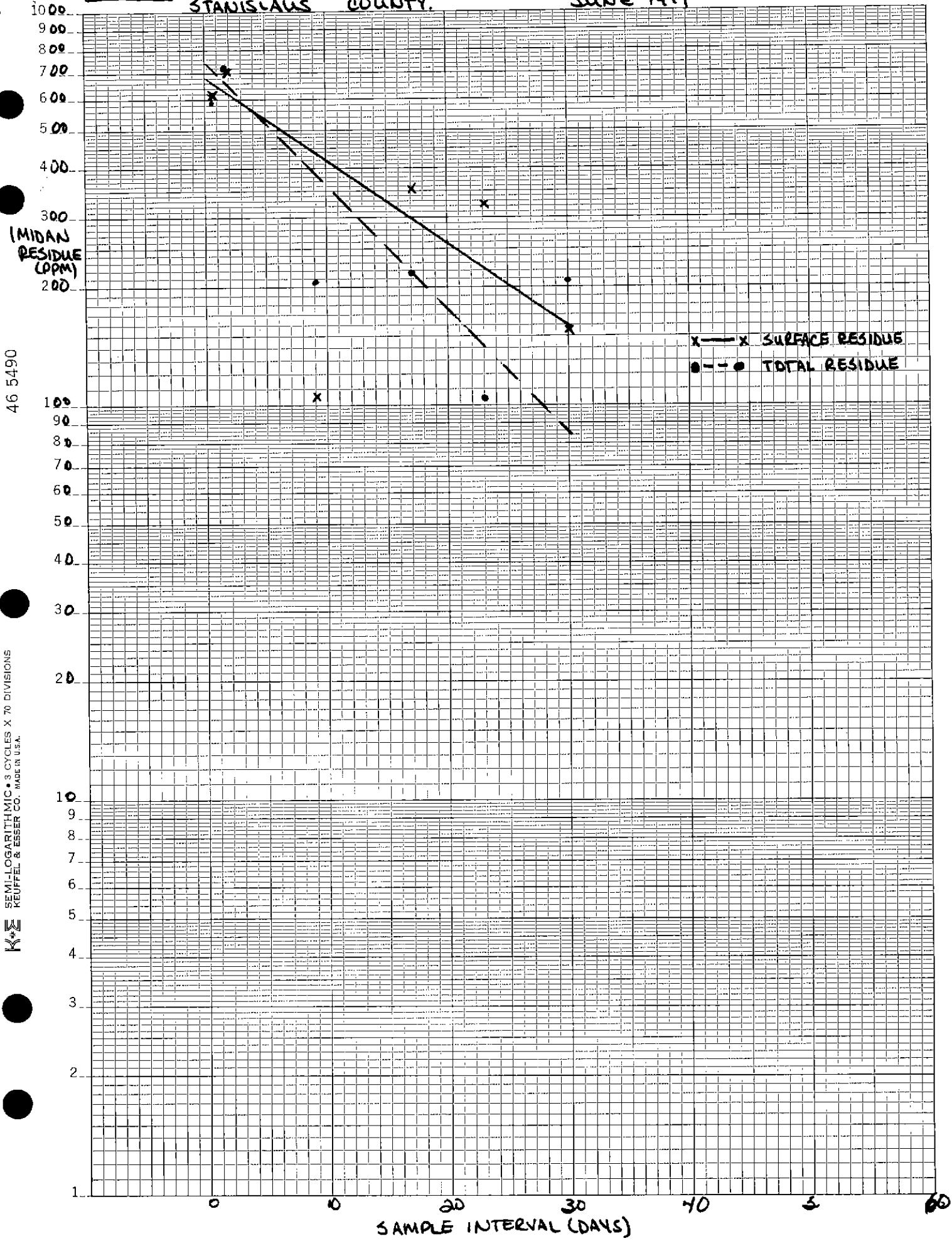
TABLE 2

IMIDAN RESIDUES ON PEACH FOLIAGE
IN STANISLAUS COUNTY

<u>Sample Date (1977)</u>	<u>Sample Interval</u>	<u>Surface Imidan (ppm)</u>	<u>Total Imidan (ppm)</u>
5/25	Presample	---	---
6/6	12 hrs	618.3	591.1
6/7	40 hrs	708.6	710.2
6/14	9 days	105.0	206.4
6/22	17 days	352	217
6/28	23 days	324	104
7/5	30 days	155.6	208.0

FIGURE 1: IMIDAN RESIDUES ON FOLIAGE OF PEACH TREES
STANISLAUS COUNTY.

JUNE 1977





IMIDAN AGRICULTURAL INSECTICIDE—WETTABLE POWDER

ACTIVE INGREDIENT:
N-(mercaptomethyl)phthalimide, S-(O,O-dimethyl phosphorodithioatoe),.....

INERT INGREDIENTS:

U.S. Patent No. 2,767,194

WARNING

HARMFUL OR FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH THE SKIN. 2-PAM ALSO IS ANTIDOTAL WHEN ADMINISTERED EARLY, AND IN CONJUNCTION WITH ATROPHINE.

USE PRECAUTIONS

Read all precautions and directions before using. Apply this product only as specified on this label.

NOTE TO PHYSICIAN: IMIDAN is an organophosphorus insecticide. ATROPHINE IS ANTIDOTAL. IMIDAN 50-WP also is antidotal when administered early, and in conjunction with atropine.

**HARMFUL OR FATAL IF SWALLOWED, INHALED OR ABSORBED THROUGH THE SKIN.
STORE IN A COOL, DRY PLACE. READ ALL DIRECTIONS BEFORE USING.**

ENVIRONMENTAL CAUTIONS

Toxic to fish and wildlife. Keep out of lakes, streams and ponds. Do not apply where runoff is likely to occur. Do not contaminate water by cleaning of equipment, or disposal of wastes.

Do not apply when weather conditions favor drift from areas treated. Highly toxic to bees exposed to direct treatment or residues on crops. Protective information may be obtained from your Cooperative Agricultural Extension Service.

The addition of a spray adjuvant is not necessary or recommended with Imidan 50-WP.

DIRECTIONS FOR USE

Pour recommended amount of this material on surface of water in nearly filled spray tank. Add balance of water to fill tank. Keep agitator running during filling and spraying operations. Do not allow mixture to stand. Do not use in gear-type spray equipment.

RECOMMENDATIONS FOR USE

ALFALFA: For control of Common Alfalfa Weevil and Egyptian Alfalfa Weevil Larvae — apply 2 pounds (IMIDAN 50-WP) in 10 to 50 gallons of water per acre (20 to 50 gallons water for dense stands) by ground equipment or 2 pounds IMIDAN 50-WP in 5 to 10 gallons of water per acre by aircraft. Consult your local County Agent or Extension Service regarding the proper timing of application. Larvae should be sprayed when they are actively feeding. Do not apply more than once per cutting. Do not braze or cut for hay within 7 days after application.

POTATOES: Colorado Potato Beetle, Potato Flea Beetle, Potato Leafhopper. (Not recommended for use on potatoes in California.) Apply 2 lbs. per acre in sufficient water to provide good coverage. Repeat applications as necessary throughout the growing season. Do not apply within 7 days of harvest.

DECIDUOUS FRUIT — FOLIAR SPRAYS

APPLES: For Apple Maggot, Codling Moth, Elm Spanworm, Green Apple Aphid, Fruit Tree Leafroller, Gypsy Moth, Plum Curculio, Red Banded Leafroller, Rosy Apple Aphid control, and Tarnished Plant Bug suppression, apply 1 to 1½ pounds per 100 gallons water (or a maximum of 6 pounds per acre per application) as a full cover spray. Use 1½ pounds per 100 gallons water for Plum Curculio. Repeat as necessary in accordance with insect infestations and local or state spray programs. Usually suppresses European Red and Two Spotted Mites when used in a seasonal program. Do not apply within 7 days of harvest. Recommended for control of Cherry Fruit Fly, Fruit Tree Leafroller and Plum Curculio in the Northeast only. Pyroicide Growers Spray per 100 gallons of water. (Limit use to Michigan only).

APRICOTS, NECTARINES, PLUMS, PRUNES:

Apricot Maggot, Grasshopper, Elm Spanworm, Peach Twig Borer, Plum Curculio, Red Banded Leafroller, Rosy Apple Aphid, and Tarnished Plant Bug suppression, apply 1 to 1½ pounds per 100 gallons water (or a maximum of 6 pounds per acre per application) as a full cover spray. Use 1½ pounds per 100 gallons water for Plum Curculio. Repeat as necessary in accordance with insect infestations and local or state spray programs. Usually suppresses European Red and Two Spotted Mites when used in a seasonal program. Do not apply to apricots or nectarines within 7 days of harvest.

50-WP

CHERRIES, SOUR (Tart): Cherry Fruit Fly, Fruit Tree Leafroller, Peach Twig Borer, Plum Curculio, apply 1 pound per 100 gallons water (or a maximum of 3½ pounds per acre per application) as a full cover spray. Repeat as necessary in accordance with insect infestations and local or state spray programs. Do not apply within 7 days of harvest. Recommended for Cherry Fruit Fly, Fruit Tree Leafroller and Plum Curculio in the Northeast only.

GRAPES: For control of Grape Leafroller and Omnivorous Leafroller, apply 2 pounds IMIDAN 50-WP in 200 gallons water per acre. Spray both sides of each row, also tops or vines to assure adequate coverage of fruit and foliage. Applications may be made at any time between egg hatch and pupation. Do not apply within 7 days of harvest. (Northeast only) Grape Berryworm, apply 2 to 3 lbs. of Imidan 50-WP in 200 gallons water per acre. Apply prebloom, post-bloom, 1st and later cover spray as needed. Grape Leafhopper, apply 2 to 3 lbs. of Imidan 50-WP in 200 gallons water per acre. Apply when most nymphs hatch. Generally coincides with berry moth. Make applications as necessary to maintain control in accordance with insect infestations and local or state spray programs. Do not apply within 14 days of harvest.

PEARS: For Codling Moth, Elm Spanworm, Fruit Tree Leafroller, Green Apple Aphid, Gypsy Moth, Pear Psylla, Plum Curculio, Red Banded Leafroller, Rosy Apple Aphid control and Tarnished Plant Bug suppression, apply 1 to 1½ pounds per 100 gallons water (or a maximum of 10 pounds per acre per application) as a full cover spray. Use 1½ pounds per 100 gallons water for Plum Curculio. Repeat as necessary in accordance with insect infestations and local or state spray programs. Usually suppresses European Red and Two Spotted Mites when used in a seasonal program. Do not apply within 7 days of harvest. Recommended for control of Elm Spanworm, Gypsy Moth and Fruit Tree Leafroller in Northeast only.

PEACHES: For Oriental Fruit Moth, Peach Twig Borer, Plum Curculio control and Tarnished Plant Bug suppression, apply 1 to 1½ pounds per 100 gallons water (or a maximum of 6 pounds per acre per application) as a full cover spray. Use 1½ pounds per 100 gallons water for Plum Curculio. Repeat as necessary in accordance with insect infestations and local or state spray programs. Usually suppresses European Red and Two Spotted Mites when used in a seasonal program. Do not apply within 7 days of harvest.

CONCENTRATE AND SEMI-CONCENTRATE FOLIAR SPRAYS (Air or Ground Equipment): When concentrate and semi-concentrate sprays are used, apply the recommended rate of IMIDAN 50-WP per acre in proportionately lower volumes of water according to equipment manufacturer's directions and state spray schedules. Do not exceed the maximum rate of IMIDAN 50-WP per acre or the time limitations specified above for the individual tree fruits. In California, use a minimum of 4 pounds IMIDAN 50-WP per acre on mature pome and stone fruit trees (3½ pounds on cherries). **DECIDUOUS SHADE AND ORNAMENTAL TREES AND WOODY EVERGREENS**

NOTE: Limit all uses for control of Gypsy Moth, Elm Spanworm and Birch Leaf Miner to the Northeast U.S. only. Recommended for Spring Cankerworm in the Northeastern and Midwestern U.S. IMIDAN 50-WP is recommended for use by commercial applicators on deciduous shade and ornamental trees and woody evergreens in parks, residential and recreational areas, along thoroughfares and other localized areas where infestations of Gypsy Moth, Spring Cankerworm, Elm Spanworm or Birch Leaf Miner occur.

* Recommended on woody evergreens (such as Arborvitae, Cedar, Fir, Hemlock, Juniper, Pine, Spruce, Yew) to control Gypsy Moth.

* Recommended on birch trees to control Birch Leaf Miner. When such insects or their damage occur, apply at a rate of 1½ pounds IMIDAN 50-WP per 100 gallons of water, thoroughly wetting all parts of the affected plants to the point of runoff. Repeat application as necessary to maintain insect control. Choose a cool, calm period, preferably in early morning or evening. Do not apply if rain is expected or before leaf surfaces are dry.

ALMONDS — DORMANT APPLICATION for San Jose Scale and Peach Twig Borer, Use 1 pound IMIDAN 50-WP per 100 gallons of water plus suitable spray oil according to oil manufacturer's specifications and local and state spray schedules. Make thorough coverage using conventional ground sprayers, wetting all parts of the tree.

DECIDUOUS TREE FRUITS — DORMANT APPLICATION (Pacific Coast states only) APPLES, APRICOTS, CHERRIES, NECTARINES, PEACHES, PEARS, PLUMS, PRUNES: San Jose Scale. APRICOTS, CHERRIES, NECTARINES, PEACHES, PLUMS, PRUNES: Peach Twig Borer. Use 1 pound IMIDAN 50-WP per 100 gallons of water plus suitable spray oil according to oil manufacturer's specifications. Make thorough coverage using ground sprayers, wetting all parts of tree. DO NOT REUSE CONTAINER. DESTROY WHEN EMPTY.

NOTICE: Stauffer Chemical Company makes no warranty, express or implied, including the warranties of merchantability and/or fitness for any particular purpose, concerning this material, except those which are contained on Stauffer's label.

EPA REG. NO. 476-1917-AA

30 POUNDS NET WT.

Made in U.S.A. by